

Amendment After Final
Serial No.: 10/605,769

FIS920030263US1
February 3, 2005

REMARKS

Claims 1 – 12, 14 – 23, 25 – 27 and 41 – 55 remain in the application. Claims 49 – 55 are allowed. Claims 1 – 12, 14 – 23, 25 – 27 and 41 – 48 stand finally rejected. Amendments to Claims 1, 2, 17 and 41 are offered herein. No new matter is added. The final rejection of the claims is respectfully traversed.

Amendments to the specification correct clear typographical errors. A proposed amendment to claims 1, 2 and 17 better places the recitation of the “lateral extension” and “lateral thickness” and are supported by claims and specification as filed. *See, e.g.*, Figures 2A – G and paragraph 0022. No new matter is added.

Claims 41 – 48 are rejected under 35 U.S.C. §112 as being indefinite. In particular, the examiner did not understand “lateral extension contact said portions” and “gate said portions” and found no antecedent basis for “said lateral extension contact portions.” While the applicants believe that “lateral extension contact said portions” and “gate said portions” adequately refer to “**portions** of a low resistance material layer disposed on said gate and [to horizontal surfaces] on said source/drain extension” (emphasis added) and so, are definite; rather than belabor this, claim 41 has been amended to recite “said portions at said angled undercut providing direct contact with said source/drain extension, said portions on said gate being separated from said portions at said angled undercut.” The amendment to claims 1, 2, 17 and 41 is not believed to be restrictive or to further limit the claims. Reconsideration and withdrawal of the rejection under 35 U.S.C. §112 as being indefinite and allowance of claims 41 – 48 is respectfully solicited.

Claims 1 – 5, 10 – 12, 14, 16 – 19, 22, 23, 25 and 27 are finally rejected under 35 U.S.C. §102(b) over U.S. Patent No. 4,788,160 to Havemann et al. Claims 6 – 9, 15, 20, 21 and 26 are finally rejected under 35 U.S.C. §103(a) over Havemann et al. in view of

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U.S. Patent No. 4,876,213 to Pfeister and U.S. Patent No. 6,608,354 B2 to Hokazono et al. The final rejection is respectfully traversed.

It has been asserted that claims 1 – 5, 10 – 12, 14, 16 – 19, 22, 23, 25 and 27 are shown in Havemann et al. by a “field effect transistor comprising a device channel (20), a gate (18), a doped extension (24 or 26), and low resistance material (30, 32, and 24).” For the “source/drain extension has a lateral thickness of less than 100Å thick” as recited in claim 2, for example, it has been asserted that “line 55 of column 6 of Havemann [teaches] that the extension has a lateral thickness of approximately 100 angstroms. Note that ‘approximately 100 angstroms’ can be less than 100Å.” As has been perviously noted, Haveman et al. and Pfeister were both initially filed in 1987 – 8. At that time a typical CMOS process was based on a 1 micron feature (e.g., minimum channel length) and lightly doped drain (LDD) was initially used to connect the source/drain regions to channels.

Although Haveman et al. recites a “lateral diffusion of approximately 100 angstroms” (Column 6, line 55), this actually refers to the diffusion of source/drain dopants which were implanted into or through the metal 28 or the unreacted metal layer 38/48 and the silicide layer 30/32 to form source/drain regions 42/44 underneath the silicide. Hence, the aforementioned citation is related to the lateral movement of junction of regions 42/44 during the silicide formation. This is **not** related to the lateral dimension of the extensions regions 24/26 (the distance between the edge of the silicide and the channel), which is fixed by the 300Å spacer 22. Further, it is apparent from the Havemann et al. disclosure that “100 angstroms” at Column 6, line 55 is a typo. It is clear from a diligent reading of Havemann et al. that instead, this should recite 1000 angstroms to be internally consistent with the remaining Havemann et al. description. Column 7 lines 27 – 35. As noted above, Havemann et al. teaches implanting into/through metal 28 or unreacted metal 38/48 and silicide 30/32. There is no lateral implant masked with spacer 22 and no build-up of metallic material 28 or 38/48 at the spacer corner. Accordingly, the total lateral effective masking distance (as measured

Amendment After Final
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February 3, 2005

from the gate edge) for such implant is the thickness of the spacer 22 plus approximately the thickness of material 28. Column 7, lines 27 – 31. Further, “the lateral diffusion approximately 1000 angstrom” at lines 34 – 35, is more consistent with other ranges recited in Havemann et al. and contradicts the abovementioned 100 angstroms upon which the final rejection is based. See, e.g., column 6, line 54, reciting downward diffusion of approximately 1500 angstroms. As far as the applicants are aware, arsenic, phosphorus, and boron diffuse nearly isotropically in silicon; neither has anything been provided to show an anisotropic diffusion in an enabling way, which is required, i.e., the reference must be enabled for showing an order of magnitude difference in diffusion direction. MPEP §2103.01. Thus, “1500 angstroms” is more consistent with “1000 angstrom lateral diffusion” than 100 angstrom for which Havemann et al. is being applied. Therefore, Havemann et al. does not suggest, much less teach the present invention as recited in claims 1 – 5, 10 – 12, 14, 16 – 19, 22, 23, 25 and 27. Accordingly, reconsideration and withdrawal of the final rejection of claims 1 – 5, 10 – 12, 14, 16 – 19, 22, 23, 25 and 27 35 U.S.C. §102(b) over Havemann et al. is respectfully solicited.

Regarding the rejection of claims 6 – 9, 15, 20, 21 and 26 under 35 U.S.C. §103(a) over Havemann et al. in view of Pfeister and Hokazono et al.; neither Pfeister nor Hokazono et al. enables anisotropically diffusing dopant such that it diffuses in any semiconductor “1500 angstroms” in one direction and, simultaneously, less than 100Å in another. Thus, neither Pfeister nor Hokazono et al. adds anything to Havemann et al. to result in the present invention as claimed in claims 1 – 5, 10 – 12, 14, 16 – 19, 22, 23, 25 and 27; much less in claims 6 – 9, 15, 20, 21 and 26, depending therefrom. Further, as has been previously noted, for a reasonable expectation of success to suggest the present invention, the references relied upon must show how to overcome the drawbacks described in the present application, i.e., how to silicide source/drain extensions without shorting the extensions to FET gates. A reasonable expectation of success is required for *prima facie* obviousness. MPEP §2142. While it was asserted that this is not encompassed by the claims, overcoming these serious impediments is necessary both for an enabling disclosure and, for a reasonable expectation of success, i.e., that in making

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the changes one would be inclined to believe that one could successfully fabricate a transistor as claimed. Accordingly, Havemann et al. in view of Pfeister and Hokazono et al. fails to overcome the shortfalls inherent in the prior art and, therefore provide an insufficient basis to establish *prima facie* obviousness. Reconsideration and withdrawal of the rejection of claims 6 – 9, 15, 20, 21 and 26 under 35 U.S.C. §103(a) is respectfully solicited.

Therefore, because a recitation in Havemann et al. of “100 angstroms” is clearly in conflict and internally inconsistent with the balance of the teaching of Havemann et al.; because neither Havemann et al. nor any reference of record teaches or enables anisotropic diffusion, which is required for internal consistency to show that “100 angstroms” is not a typographical error from an omission of a zero; because none of the references of record teach how to overcome the inherent shortfalls in the prior art and so, fail to provide a reasonable expectation of success; the present invention is not taught nor *prima facie* obviousness over Havemman et al., alone or in combination with any reference of record. Reconsideration and withdrawal of the rejection of claims 1 – 12, 14 – 23 and 25 – 27 under 35 U.S.C. §102(b) and §103(a) is respectfully solicited.

The applicants thank the Examiner for efforts, both past and present, in examining the application. Believing the application to be in condition for allowance, both for the amendment to the claims and for the reasons set forth above, the applicants respectfully request that the Examiner enter the amendment, reconsider and withdraw the rejection of claims 41 – 48 under 35 U.S.C. §112, reconsider and withdraw the final rejection of claims 1 – 5, 10 – 12, 14, 16 – 19, 22, 23, 25 and 27, under 35 U.S.C. §102(b), reconsider and withdraw the final rejection of claims 6 – 9, 15, 20, 21 and 26 under 35 U.S.C. §103(a) and allow the application to issue.

Should the Examiner believe anything further may be required, the Examiner is requested to contact the undersigned attorney at the local telephone number listed below for a telephonic or personal interview to discuss any other changes.


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Please charge any deficiencies in fees and credit any overpayment of fees to IBM Corporation Deposit Account No. 09-0458 and advise us accordingly.

Respectfully Submitted,

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